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| 10/773,870  | 02/06/2004  | Trevor Dean          | A36142-PCT-USA; 0720 | 7221             |
| 21003   | 7590        | 07/20/2006           | EXAMINER             |                  |
| BAKER & BOTTS<br>30 ROCKEFELLER PLAZA<br>44TH FLOOR<br>NEW YORK, NY 10112 |             |                      |                      | KINNEY, ANNA L   |
| ART UNIT  |             | PAPER NUMBER         |                      |                  |
|   |             | 1731                 |                      |                  |

DATE MAILED: 07/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                         |                  |
|------------------------------|-------------------------|------------------|
| <b>Office Action Summary</b> | Application No.         | Applicant(s)     |
|                              | 10/773,870              | DEAN, TREVOR     |
|                              | Examiner<br>Anna Kinney | Art Unit<br>1731 |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

1) Responsive to communication(s) filed on 03 May 2006.

2a) This action is FINAL. 2b) This action is non-final.

3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

4) Claim(s) 16-35,39 and 41 is/are pending in the application.

4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.

5) Claim(s) \_\_\_\_\_ is/are allowed.

6) Claim(s) 16-35,39 and 41 is/are rejected.

7) Claim(s) \_\_\_\_\_ is/are objected to.

8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

9) The specification is objected to by the Examiner.

10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) All b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

1) Notice of References Cited (PTO-892)  
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)  
 3) Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
 Paper No(s)/Mail Date \_\_\_\_\_.

4) Interview Summary (PTO-413)  
 Paper No(s)/Mail Date. \_\_\_\_\_.  
 5) Notice of Informal Patent Application (PTO-152)  
 6) Other: \_\_\_\_\_.

## DETAILED ACTION

### ***Response to Arguments***

Applicant's arguments, see Remarks, pg. 12-13, filed May 3, 2006, with respect to the rejection(s) of claim(s) 16 and 39 under 35 USC 103(a) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of Rugg et al (U.S. 4,316,747).

The Examiner acknowledges cancellation of claim 37, and accordingly has withdrawn the 35 USC 102(b) rejection. As a result of applicant's amendment, claim 41 is now rejected under 35 USC 103(a).

### ***Specification***

The disclosure is objected to because of the following informalities: The Examiner suggests that the applicant review the specification for typographical errors; for instance, on page 2, ¶ 0004, line 4, the word "modem" should be "modern".

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 16, 18-31, 34, 35, and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart (EP 0122769 A2) in view of Hester et al (U.S. Patent

6,063,204), Rugg et al (U.S. 4,316,747), Birdseye (U.S. Patent 2,862,814) and Jacobs et al.

With respect to claim 16, Stewart discloses a method for treating raw elongate material suitable for use in a paper making plant (p. 1, lines 2-7) comprising: extracting contrary material from the raw material, including a slotted grid which the Examiner construes to extract contaminants found in the raw material (p. 5, lines 21-29 and pg. 6, lines 16-20); crushing the raw material from which contrary material has been removed to remove unwanted material therefrom (p. 4, lines 9-19); splitting the crushed raw material lengthways (p. 7, lines 9-18).

Stewart does not disclose expressly supplying the material to a co-rotating screw conveyor or recovering black liquor.

Hester et al discloses supplying the raw material (Fig. 1, item 113) to a co-rotating screw conveyor divided into a plurality of zones (col. 14, lines 22-29) and processing said material in said conveyor; supplying treatment material to at least one zone (col. 15, lines 26-51); and controlling the temperature of the zones (col. 20, lines 46-63); and discloses a chemical recovery system (col. 15, lines 39-45).

Hester et al does not disclose producing pulp and a black liquor effluent, nor recovering black liquor, and does not disclose a section of flights going in a reverse direction.

Rugg discloses a method for treating material suitable for use in a paper making plant (col. 3, lines 50-56 and col. 6, lines 1-5) comprising supplying the material to a co-rotating screw conveyor divided into a plurality of zones (col. 3, lines 38-49 and col. 4,

lines 33-41) and processing said material in said conveyor (col. 2, lines 29-33), wherein the co-rotating screw conveyor further comprises a first section, a second section, and a third section, wherein the first and third sections have flights going in a first direction (Fig. 6, items 22a and 22b) and the second section has flights going in a second direction which is reverse of the first direction (Fig. 6, item 24).

Birdseye discloses producing pulp and black liquor in a screw conveyor (col. 3, lines 46-69 and col. 4, lines 14-29).

Jacobs et al discloses feeding concentrated black liquor (p. 1, lines 12-20) into a processing vessel in the form of a fluidised bed reactor for treatment of said black liquor (p. 3, lines 2-21), said processing vessel being part of treatment material and energy recovery means (p. 1, lines 21-29 and p. 10, lines 25-29). Jacobs et al does not disclose expressly that the black liquor is sprayed into the fluidized bed reactor. However, since this is a standard method of feeding a fluidized bed reactor, it would have been obvious to a person of ordinary skill in the art to do so at the time of the invention.

Stewart, Hester, Rugg, Birdseye, and Jacobs are analogous art because they are all from the same field of endeavor, that of treating lignocellulosic materials and recovering the digestion liquor from treatment.

At the time of the invention, it would have been obvious to use the screw conveyor reactor as described by Hester, with zones with alternating flight directions as described by Rugg, the pulping process as described by Birdseye, and the fluidized bed

reactor as described by Jacobs to further treat the fibrous material of Stewart and to recover the chemicals used to obtain the invention as specified in claim 16.

The motivation would have been to provide for a more compact and economical design, much more amenable to successful commercialization (Hester, col. 13, lines 41-45); to form a dynamic plug which seals the reaction zone and prevents gases from escaping while continuously conveying the input into the reaction zone (Rugg, col. 5, lines 17-21); to provide for extraordinarily efficient production of pulp (Birdseye, col. 2, lines 46-59); and to recover both sodium and sulfur for use in pulping (Jacobs, p. 3, lines 2-4).

With respect to claim 18, Stewart discloses that the crushing of the raw material takes place between a pair of counter rotating knurled (e.g., fluted) rollers between which the raw material passes (p. 6, line 26 – p. 7, line 1).

With respect to claim 19, Stewart discloses that the splitting of the crushed material takes place between a counter rotating pinned roller (Fig. 1, item 25) and a top roller (Fig. 1, item 13) between which the crushed material passes. Stewart does not disclose a pair of pinned rollers. However, Stewart does disclose using a pinned plate or pinned stripper and worker roller pairs with the pinned roller (p. 4, line 34 – p. 5, line 2). At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a pair of rollers to achieve the additional cleaning effect discussed by Stewart.

With respect to claim 20, Stewart discloses that between the steps of crushing the raw material and splitting the crushed material, further removal of contrary material present in the crushed material is carried out (p. 4, lines 9-27 and line 34 – p. 5, line 1).

With respect to claim 21, Hester discloses the addition of steam at a point along the co-rotating twin screw conveyor (col. 30, lines 8-24).

With respect to claim 22, Hester discloses an increase or decrease of pressure at a point within the corotating twin screw conveyor (col. 36, Table, line 16; col. 30, lines 22-24).

With respect to claim 23, Hester discloses that raw material is passed through a screw conveyor having at least three zones (col. 15, lines 21-25) comprising a feed zone (e.g., mixing, col. 28, line 60), a treatment zone (e.g., impregnation, col. 29, line 31) to which treatment material is added (col. 15, lines 26-29 and 52-54) and a pressure zone (e.g., reaction, col. 30, line 7) maintained at a pressure above atmospheric (col. 36, Table, line 16).

With respect to claims 24, 25, 26, and 27, Hester does not disclose expressly that the screw conveyor has five zones. However, Hester does disclose subdividing the three disclosed zones (col. 31, lines 30-41). At the time of the invention, it would have been obvious to a person of ordinary skill in the art that if the reaction zone is divided into three zones, the screw conveyor would comprise five zones. Absent a showing of unexpected results, it would have further been obvious to optimize the pressures and temperatures of each zone to achieve the desired results within the limitations of the equipment.

With respect to claim 26, Hester discloses inserting steam into the treatment zone (col. 30, lines 8-24) and inserting pulping agents into the first pressure zone (col.15, lines 26-51).

With respect to claim 28, Hester and Birdseye do not disclose expressly that calcium hydroxide is added to the first pressure zone. However, Birdseye discloses using digestive solutions, and Hester discloses adding digestive solution in the first pressure zone. At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use calcium hydroxide to control the pH of the digestive solution in the first pressure zone.

With respect to claims 29 and 30, Jacobs discloses passing the black liquor at a concentration of greater than 50% solids (p. 1, lines 12-20), which contains one specific point within the claimed range of 10-70% solids for claim 29, and the claimed range of 30-70% solids for claim 30, to the processing vessel (p. 4, lines 5-9), and treating the concentrated liquor therein at a temperature of between 650°C – 850°C (p. 8, lines 11-27) or lower (p. 8, lines 3-10), which contains one specific point within the claimed range of between 300-650°C. The Examiner notes that in the amended claim, the degree sign appears to have inadvertently been dropped, since the original claim contained the sign.

With respect to claim 31, Hester and Birdseye are applied as in the rejection of claim 16, above, regarding receiving black liquor from a co-rotating twin screw conveyor, and Jacobs is applied as in the rejection to claim 30, above, regarding the solids range and treatment temperature. The Examiner notes that in the amended

claim, the degree sign appears to have inadvertently been dropped, since the original claim contained the sign.

With respect to claim 34, Jacobs discloses chemically converting the material in the fluidised bed into sodium carbonate (p. 5, lines 3-10) and a gas (p. 5, lines 22-30) and liquids (p. 7, lines 27-30) with a combustible component (p. 6, lines 18-26) which can be utilised for energy production.

With respect to claim 35, Stewart discloses that the raw elongate material is straw (p. 3, lines 7-12).

With respect to claim 41, Jacobs discloses comprising passing the liquor at a concentration of greater than 50% solids (p. 1, lines 12-20), which contains one specific point within the claimed range of 10-70% solids, to a processing vessel (p. 4, lines 5-9), and treating the concentrated liquor therein at a temperature of between 650°C – 850°C (p. 8, lines 11-27) or lower (p. 8, lines 3-10), which contains one specific point within the claimed range of between 300-650°C. The Examiner notes that in the amended claim, the degree sign appears to have inadvertently been dropped, since the original claim contained the sign.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart, Hester, Rugg, Birdseye, and Jacobs, as applied to claim 16 above, and further in view of Nolan (U.S. Patent 2,905,973).

With respect to claim 17, Stewart, Hester, Rugg, Birdseye, and Jacobs do not disclose expressly that the extraction step takes place on a conveyor belt.

Nolan discloses that extraction of contrary material takes place on a conveyor belt provided with means for enabling the removal of contrary material (col. 3, lines 17-49).

Stewart, Hester, Rugg, Birdseye, Jacobs, and Nolan are analogous art because they are all from the same field of endeavor, that of treating lignocellulosic materials and recovering the digestion liquor from treatment.

At the time of the invention, it would have been obvious to use conveyor belt extraction means as described by Nolan in the pulp production and chemical recovery process of Stewart, Hester, Rugg, Birdseye, and Jacobs to obtain the invention as specified in claim 17.

The motivation would have been to separate pith from fibers economically and rapidly, in a way that is adaptable to large scale commercial operation, and that will permit greater yields of cleaned fibers (col. 2, lines 14-27).

Claims 32 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart, Hester, Rugg, Birdseye, and Jacobs, as applied to claim 16 above, and further in view of Adams et al (U.S. Patent 6,063,237).

With respect to claim 32, Jacobs discloses gasifying black liquor with an earth oxide (e.g., CaO, p. 3, lines 2-21), under sub-stoichiometric conditions (p. 4, lines 5-20).

Stewart, Hester, Rugg, Birdseye, and Jacobs do not disclose expressly that the black liquor is fed to a toroidal fluidised bed containing an earth oxide at a specific ratio.

Adams et al discloses a toroidal fluidized bed (col. 6, lines 48-55) treating material contained in effluent (col. 4, lines 1-10). Absent a showing of unexpected

results, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to optimize the ratio of earth oxide to black liquor solids.

With respect to claim 33, Stewart, Hester, Birdseye, Jacobs, and Adams do not disclose expressly that the fluidized bed is fed with a twin screw conveyor or that the black liquor solids / earth oxide mixture becomes a granular friable material. However, at the time of the invention, it would have been obvious to a person of ordinary skill in the art to use any appropriate apparatus to feed the fluidized bed, depending upon the qualities of the material to be fed. Screw conveyors are well known in the art for feeding process equipment. It would further be obvious that if the black liquor and earth oxide were mixed under the same conditions and in the same equipment as the instant invention, the resulting material would have the same qualities as that claimed, i.e., it would be granular friable.

Stewart, Hester, Rugg, Birdseye, Jacobs, and Adams are analogous art because they are all from the same field of endeavor, that of treating lignocellulosic materials and recovering the digestion liquor from treatment.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use a toroidal fluidized bed as described by Adams in the recovery process of Stewart, Hester, Birdseye, and Jacobs to obtain the invention as specified in claims 32 and 33.

The motivation would have been that it is suitable for heat treatment of a material to convert the inorganic content of such material to a form suitable for re-use (col. 2, lines 52-63).

Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hester et al in view of Rugg and Birdseye.

With respect to claim 39, Hester et al discloses a method of treating raw material comprising passing the raw material through a plurality of zones (including pretreatment, i.e., impregnation, col. 29, line 31) in a co-rotating twin screw conveyor (col. 14, lines 22-29), inserting treatment material into at least one zone (col. 15, lines 26-29) and controlling the temperature of at least one of the zones (col. 15, line 66 – col. 16, line 2).

Hester et al does not disclose expressly pulping, or a section of flights going in a reverse direction.

Birdseye discloses pulping raw material in a screw conveyor (col. 3, lines 46-69).

Rugg discloses a method for treating material (col. 3, lines 50-56 and col. 6, lines 1-5) comprising passing the material through to a a plurality of zones in a co-rotating screw conveyor (col. 2, lines 29-33, col. 3, lines 38-49, and col. 4, lines 33-41), wherein the co-rotating screw conveyor further comprises a first section, a second section, and a third section, wherein the first and third sections have flights going in a first direction (Fig. 6, items 22a and 22b) and the second section has flights going in a second direction which is reverse of the first direction (Fig. 6, item 24), inserting treatment material into at least one zone (col. 4, lines 6-15), and controlling the temperature and pressure of at least one of the zones (col. 2, lines 26-29).

Hester, Rugg, and Birdseye are analogous art because they are from the same field of endeavor, that of treating lignocellulosic materials in a screw conveyor reactor.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the twin screw conveyor of Hester, with zones with alternating flight directions as described by Rugg, to obtain pulp as described by Birdseye to obtain the invention as specified in claim 39.

The motivation would have been to provide for extraordinarily efficient production of pulp (Birdseye, col. 2, lines 46-59) and to form a dynamic plug which seals the reaction zone and prevents gases from escaping while continuously conveying the input into the reaction zone (Rugg, col. 5, lines 17-21).

### ***Conclusion***

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anna

Kinney whose telephone number is (571) 272-8388. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steven Griffin can be reached on 571-272-1189. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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